# 51 The Full Course


Have you ever taken antibiotics? Did you follow the directions completely? All antibiotics need to be taken as directed, which usually means taking all the pills and not stopping even if you begin feeling better. Why?

Millions of harmless bacteria naturally live on and inside of your body. When harmful bacteria appear on the scene, your body's immune system can usually keep a small population of them under control. If, however, these bacteria reproduce too quickly, you suffer consequences—and this is called an infection. Antibiotics help your body fight off an infection by killing these harmful bacteria. Unfortunately, a small number of bacteria in any population may not be affected by the antibiotic as quickly. These bacteria, which are considered more **resistant** to the treatment, continue to reproduce and grow. Completing the **full course** of the antibiotic as prescribed helps make sure that these bacteria do not survive and therefore won't make you ill or infect anyone else.

CHALLENGE **Why is it important to take an antibiotic as prescribed?**

## MATERIALS

*For each pair of students*

- **50 disks (20 green, 15 blue, 15 orange)**
- **4 colored pencils (including green, blue, orange)**
- **1 number cube**

*For each student*

- **1 Student Sheet 51.1, "Anticipation Guide: Miracle Drugs?"**
- **1 Student Sheet 51.2, "Population Data"**
- **1 Student Sheet 51.3, "Bacteria Graph"**

## *A Bacterial Infection*

Imagine that you are sick with a bacterial infection. Your doctor prescribes an antibiotic to be taken every day for eight days.

Colored disks represent the harmful bacteria that are in your body:

| **Disease-Causing Bacteria** | **Represented By** |
|---|---|
| Least resistant bacteria | green disks |
| Resistant bacteria | blue disks |
| Extremely resistant bacteria | orange disks |

Each time you toss a number cube, it is time to take the antibiotic. The number on the number cube tells you what to do.

## PROCEDURE

*Complete the "Before" column only of Student Sheet 51.1, "Anticipation Guide: Miracle Drugs?"*

1. In this activity, you will work with your partner to collect data. Begin with 20 disks: 13 green, 6 blue, and 1 orange. These disks represent the harmful bacteria living in your body before you begin to take the antibiotic. Set the extra disks aside for now.
2. It is time to take your antibiotic. Toss a number cube and follow the directions in the Number Cube Key (on the next page).

**Number Cube Key**

| You Toss | What Happened | What To Do |
|---|---|---|
| 1, 3, 5, 6 | You took the antibiotic on time, so bacteria are being killed! | Remove 5 disks: remove all of the green disks first, then the blue, then the orange. |
| 2, 4 | You forgot to take the antibiotic. | Do nothing. |

3. *The bacteria are reproducing all of the time!* If one or more bacteria of a particular type are still alive in your body, add 1 disk of that color to your population.

   For example, if you have resistant (blue) and extremely resistant (orange) bacteria in your body, add 1 blue disk and 1 orange disk to your population.
4. Record the number of each type of bacteria in your body in Table 1, "Number of Harmful Bacteria in Your Body," on Student Sheet 51.2, "Population Data."

5. Repeat Steps 2–4 until you have completed Table 1.
6. Use your data in Table 1 to graph the population for each type of bacteria and for the total number of bacteria on Student Sheet 51.3, "Bacteria Graph." Use different colored lines, or lines with different patterns, to represent each type of bacteria, and fill in the key accordingly.

## ANALYSIS

1. Did the antibiotic help you to completely kill all of the harmful bacteria living in your body? Explain.

2. **a.** Imagine infecting someone else immediately after catching the infection (before you started taking the antibiotic). With what type of bacteria would you be most likely to infect them?

   **b.** Imagine infecting someone else near the end of your antibiotic course. With what type of bacteria would you be most likely to infect them?

   **c.** Suppose most infected people stopped taking the antibiotic when they began to feel better. (For example, consider the point in the simulation when there were only three harmful bacteria left.) What do you predict might happen to an antibiotic's ability to kill the harmful bacteria if the infection returns? Explain your reasoning.

3. Use your graph to describe how the population of each type of bacteria changed over the course of the antibiotic treatment.

4. Why is it important to complete the full course of an antibiotic as prescribed?
5. Was this activity a good model of an antibiotic treatment? Explain.
6. You find out that you have a viral infection and not a bacterial infection. What would happen to the amount of virus in your body each time you took the antibiotic? Explain.
7. **Reflection 1:** Many scientists now think that the overuse of such products as antibacterial hand cleansers contributes to an increase of antibiotic-resistant bacteria. Based on what you have learned so far in this unit, do you agree? Explain.
8. **Reflection 2:** Have you or your family members ever taken an antibiotic? If so, which one(s) were taken and what were they taken for? If you are not sure, find out from your parents in preparation for the next activity.